



# 10

SEQUENCE LISTING

<110> Rajgarhia, Vineet

<120> Methods and materials for synthesis of organic products

<130> 00-1237-A

<140> 09/992,430

<141> 2001-11-23

<150> 60/252,541

<151> 2000-11-22

<160> 65

<170> PatentIn version 3.1

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 gccggtagag gtgtggtca 79

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gtcagcagca tagggaaaca cggcttttcc taccaaactc aaggaattat caaactctgc 180  
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cagtgttaca accaattaac caattctgat tagaaaaact catcgagcat caaatgaaac 660  
tgcaatttat tcatatcagg attatcaata ccatattttt gaaaaagccg tttctgtaat 720  
gaaggagaaa actcaccgag gcagttccat aggatggcaa gatcctggta tcggtctgcg 780  
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catcaccgat ggggaagatc gggctcgcca cttcgggctc atgagcgctt gtttcggcgt	1680
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tgaccaaggt caaggatgct gctaagggtt acaagccagt tccagttcct cacgctccaa	180
gagacaacaa gccagttgct gactctactc cattgaagca agaatgggtc tggactcaag	240
tcggtaagtt cctacaagaa ggtgatgttg ttctaactga aaccgggtacc tccgctttcg	300
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ccattgggtt ca	372

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acgcttacgc cagaatcaag ggtatgtcct gtttgatcac caccttcggt gtcggtgagt	180
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tcggtgtccc atccgtctcc gccaggcca agcagctatt gttgcaccac accttgggta	300
acggtgactt cactgtcttc cacagaatgt ccgccaacat ctctgagacc actgctatga	360
tcactgatct agctaccgcc ccatctgaga tcgacagatg tatcagaacc acctacatta	420
gacagagacc tgtctacttg ggtttgccat ctaacttcgt tgaccagatg gtcccagcct	480
ctctattgga caccccaatt gacttggcct tgaagccaaa cgaccagcag gctgaggagg	540
aggtcatctc tactttgttg gagatgatca aggacgctaa gaaccagtc atcttggctg	600
acgcttgccg ttccagacac gatgtcaagg ctgagaccaa gaagttgatt gacatcactc	660

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tcggtggtgt ctacgtcggt accttgt	747

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aacttgcaca ttaacttgaa gctcagtcga ttgagtgaac ttgatcaggt tgtgcagctg	120
gtcagcagca tagggaaaca cggcttttcc taccaaactc aaggaattat caaactctgc	180
aacacttgcg tatgcaggta gcaagggaaa tgtcatactt gaagtcggac agtgagtgta	240
gtcttgagaa attctgaagc cgtattttta ttatcagtga gtcagtcac aggagatcct	300
ctacgccgga cgcacgtgg cgcacctgca gggggggggg gggcgctgag gtctgcctcg	360
tgaagaaggt gttgctgact cataccaggc ctgaatcgcc ccatcatcca gccagaaagt	420
gagggagcca cggttgatga gagctttggt gtaggtggac cagttggtga ttttgaactt	480
ttgctttgcc acggaacggt ctgctgtgtc gggaagatgc gtgatctgat ctttcaactc	540
agcaaaagtt cgatttattc aacaaagccg ccgtcccgtc aagtcagcgt aatgctctgc	600
cagtgttaca accaattaac caattctgat tagaaaaact catcgagcat caaatgaaac	660
tgcaatttat tcatatcagg attatcaata ccatattttt gaaaaagccg tttctgtaat	720
gaaggagaaa actcaccgag gcagttccat aggatggcaa gatcctggta tcggtctgcg	780
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<210> 14  
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18

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19

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21

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ggatccacac ttacagtttc aaccgttggt gattattttg gggttgaaca aattgctata 840  
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<213> Kluyveromyces thermotolerans

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Tyr Thr Leu Leu Leu Ser Gly Ile Val Ser Glu Ile Val Leu Ile Asp  
35 40 45

Val Asn Lys Asp Lys Ala Glu Gly Glu Ser Met Asp Leu Asn His Ala  
50 55 60

Ala Pro Ser Asn Thr Arg Ser Arg Ala Gly Asp Tyr Pro Asp Cys Ala  
65 70 75 80

Gly Ala Ala Ile Val Ile Val Thr Cys Gly Ile Asn Gln Lys Asn Gly  
85 90 95

Gln Thr Arg Met Asp Leu Ala Ala Lys Asn Ala Asn Ile Met Leu Glu  
100 105 110

Ile Ile Pro Asn Val Ala Lys Tyr Ala Pro Asp Thr Ile Leu Leu Ile  
115 120 125

Ala Thr Asn Pro Val Asp Val Leu Thr Tyr Ile Ser Tyr Lys Ala Ser  
130 135 140

Gly Phe Pro Leu Ser Arg Val Ile Gly Ser Gly Thr Val Leu Asp Thr  
145 150 155 160

Ala Arg Phe Lys Tyr Ile Leu Gly Glu His Phe Lys Ile Ser Ser Asp  
165 170 175

Ser Ile Asp Ala Cys Val Ile Gly Glu His Gly Asp Gly Val Pro Val  
180 185 190

Trp Ser Leu Thr Asn Ile Asp Gly Met Lys Leu Arg Asp Tyr Cys Glu  
195 200 205

Lys Ala Asn His Ile Phe Asp Gln Asn Ala Phe His Arg Ile Phe Glu  
210 215 220

Gln Thr Arg Asp Ala Ala Tyr Asp Ile Ile Lys Arg Lys Gly Tyr Thr  
225 230 235 240

Ser Tyr Gly Ile Ala Ala Gly Leu Leu Arg Ile Val Lys Ala Ile Leu  
245 250 255

Glu Asp Thr Gly Ser Thr Leu Thr Val Ser Thr Val Gly Asp Tyr Phe  
260 265 270

Gly Val Glu Gln Ile Ala Ile Ser Val Pro Thr Lys Leu Asn Lys Ser  
275 280 285

Gly Ala His Gln Val Ala Glu Leu Ser Leu Asp Glu Lys Glu Ile Glu  
290 295 300

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Glu Ile Asn

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28

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48

tcc aca aca gct tac acg tta tta ttg agt agt ttg gtt gct gaa gtg  
Ser Thr Thr Ala Tyr Thr Leu Leu Leu Ser Ser Leu Val Ala Glu Val  
20 25 30

96

gtg ttg ata gat gtc gat aaa aga aag gtc gaa ggc caa ttt atg gat  
Val Leu Ile Asp Val Asp Lys Arg Lys Val Glu Gly Gln Phe Met Asp  
35 40 45

144

ctg aac cac gcg gct cct tta acg aag gag tca cga ttc agt gct ggg  
Leu Asn His Ala Ala Pro Leu Thr Lys Glu Ser Arg Phe Ser Ala Gly  
50 55 60

192

gac tat gaa agt tgt gct gat gct gcg gtt gta atc gta acg ggc ggg  
Asp Tyr Glu Ser Cys Ala Asp Ala Ala Val Val Ile Val Thr Gly Gly  
65 70 75 80

240

gct aat cag aaa cct ggt caa act aga atg gag cta gcc gag agg aac  
Ala Asn Gln Lys Pro Gly Gln Thr Arg Met Glu Leu Ala Glu Arg Asn  
85 90 95

288

gtt aaa atc atg cag gaa gtg atc cct aag att gtg aaa tac gcc ccc  
Val Lys Ile Met Gln Glu Val Ile Pro Lys Ile Val Lys Tyr Ala Pro  
100 105 110

336

aac gca att ttg ctg att gca aca aac cct gtc gat gta ctt acc tat  
Asn Ala Ile Leu Leu Ile Ala Thr Asn Pro Val Asp Val Leu Thr Tyr  
115 120 125

384

gct agt ttg aaa gcg tcg gga ttc cca gca agc cgg gtt att ggt tct

432

Ala Ser Leu Lys Ala Ser Gly Phe Pro Ala Ser Arg Val Ile Gly Ser  
 130 135 140

ggg aca gtt ctc gac tct gct cgt ata cag cac aac ctg agc aag cta 480  
 Gly Thr Val Leu Asp Ser Ala Arg Ile Gln His Asn Leu Ser Lys Leu  
 145 150 155 160

ttc aat gtt tca tct gaa agt gtc aac gcg ttt att atc ggg gaa cat 528  
 Phe Asn Val Ser Ser Glu Ser Val Asn Ala Phe Ile Ile Gly Glu His  
 165 170 175

ggt gac tca agt gtg ccc gtc tgg tcg ctt gct gag att gcc ggc atg 576  
 Gly Asp Ser Ser Val Pro Val Trp Ser Leu Ala Glu Ile Ala Gly Met  
 180 185 190

aaa gtg gag gat tac tgt agg cag tcc aag aga aag ttt gac ccc agc 624  
 Lys Val Glu Asp Tyr Cys Arg Gln Ser Lys Arg Lys Phe Asp Pro Ser  
 195 200 205

att ctg acc aaa ata tat gag gag tcg cgt gac gcg gca gcc tac atc 672  
 Ile Leu Thr Lys Ile Tyr Glu Glu Ser Arg Asp Ala Ala Ala Tyr Ile  
 210 215 220

ata gaa cgc aaa ggc tat acc aat ttc ggg att gca gca ggt ttg gct 720  
 Ile Glu Arg Lys Gly Tyr Thr Asn Phe Gly Ile Ala Ala Gly Leu Ala  
 225 230 235 240

agg ata gtg aga gct att ctg aga gat gaa ggt gcc cta tta act gtg 768  
 Arg Ile Val Arg Ala Ile Leu Arg Asp Glu Gly Ala Leu Leu Thr Val  
 245 250 255

tct act gta ggt gag cac ttt ggc atg aaa gat gtt tca ttg agt gtt 816  
 Ser Thr Val Gly Glu His Phe Gly Met Lys Asp Val Ser Leu Ser Val  
 260 265 270

cca act agg gta gac agg agc ggc gct cac cat gtc gtc gac ctt ctg 864  
 Pro Thr Arg Val Asp Arg Ser Gly Ala His His Val Val Asp Leu Leu  
 275 280 285

cta aac gac aag gag ctg gag caa att aaa aca tct gga gcc aag ata 912  
 Leu Asn Asp Lys Glu Leu Glu Gln Ile Lys Thr Ser Gly Ala Lys Ile  
 290 295 300

aag tca gcc tgt gat gaa ctt ggc att 939  
 Lys Ser Ala Cys Asp Glu Leu Gly Ile  
 305 310

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 <213> *Torulaspora pretoriensis*

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20 25 30

Val Leu Ile Asp Val Asp Lys Arg Lys Val Glu Gly Gln Phe Met Asp  
35 40 45

Leu Asn His Ala Ala Pro Leu Thr Lys Glu Ser Arg Phe Ser Ala Gly  
50 55 60

Asp Tyr Glu Ser Cys Ala Asp Ala Ala Val Val Ile Val Thr Gly Gly  
65 70 75 80

Ala Asn Gln Lys Pro Gly Gln Thr Arg Met Glu Leu Ala Glu Arg Asn  
85 90 95

Val Lys Ile Met Gln Glu Val Ile Pro Lys Ile Val Lys Tyr Ala Pro  
100 105 110

Asn Ala Ile Leu Leu Ile Ala Thr Asn Pro Val Asp Val Leu Thr Tyr  
115 120 125

Ala Ser Leu Lys Ala Ser Gly Phe Pro Ala Ser Arg Val Ile Gly Ser  
130 135 140

Gly Thr Val Leu Asp Ser Ala Arg Ile Gln His Asn Leu Ser Lys Leu  
145 150 155 160

Phe Asn Val Ser Ser Glu Ser Val Asn Ala Phe Ile Ile Gly Glu His  
165 170 175

Gly Asp Ser Ser Val Pro Val Trp Ser Leu Ala Glu Ile Ala Gly Met  
180 185 190

Lys Val Glu Asp Tyr Cys Arg Gln Ser Lys Arg Lys Phe Asp Pro Ser  
195 200 205

Ile Leu Thr Lys Ile Tyr Glu Glu Ser Arg Asp Ala Ala Ala Tyr Ile  
210 215 220

Ile Glu Arg Lys Gly Tyr Thr Asn Phe Gly Ile Ala Ala Gly Leu Ala  
225 230 235 240

Arg Ile Val Arg Ala Ile Leu Arg Asp Glu Gly Ala Leu Leu Thr Val  
245 250 255

Ser Thr Val Gly Glu His Phe Gly Met Lys Asp Val Ser Leu Ser Val  
260 265 270

Pro Thr Arg Val Asp Arg Ser Gly Ala His His Val Val Asp Leu Leu  
275 280 285

Leu Asn Asp Lys Glu Leu Glu Gln Ile Lys Thr Ser Gly Ala Lys Ile  
290 295 300

Lys Ser Ala Cys Asp Glu Leu Gly Ile  
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gctctagatg aaaacacaat ttacacc

27

<210> 34  
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<212> DNA  
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<400> 34  
atggatcctt acacaaaagc tctgtcgc

28

<210> 35  
<211> 26  
<212> DNA  
<213> Rhizopus oryzae

<400> 35  
ctttattttt ctttacaata taattc

26

<210> 36  
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<212> DNA  
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<400> 36  
actagcagtg caaaacatg

19

<210> 37  
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<400> 37  
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29

<210> 38  
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<213> Rhizopus oryzae

<400> 38  
gctctagatc aacagctact tttagaaaag

30

<210> 39  
<211> 28  
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<220>  
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<400> 39  
aaatctagat gagccatatt caacggga

28

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<220>  
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<400> 40



ccggatcctt agaaaaactc atcgagcat

29

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<213> Kluyveromyces thermotolerans

<400> 41  
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36

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<400> 42  
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34

<210> 43  
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tgcacaatag gcatttgcaa gaattactcg tgagtaagga aagagtgagg aactatcgca 180  
tacctgcatt taaagatgcc gatttgggcg cgaatccttt attttggctt caccctcata 240  
ctattatcag ggccagaaaa aggaagtgtt tcctccttc ttgaattgat gttaccctca 300  
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tcaatgcaag aaatacatat ttggtctttt ctaattcgta gtttttcaag ttcttagatg 780  
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gaattgttta caagttctct gtaccaccat ggagacatca aaaattgaaa atctatggaa	2160
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cgcggccgc	2229

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<400> 44  
 tggactagta aaccaacagg gattgcctta gt

<211> 33  
<212> DNA  
<213> Candida sonorensis

<400> 45  
ctagtctaga gatcattacg ccagcatcct agg

33

<210> 46  
<211> 37  
<212> DNA  
<213> Candida albicans

<400> 46  
gcgatctcga ggtcctagaa tatgtatact aatttgc

37

<210> 47  
<211> 36  
<212> DNA  
<213> Candida albicans

<400> 47  
acttggccat ggtgatagtt attcttctgc aattga

36

<210> 48  
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<213> Saccharomyces cerevisiae

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tgtcatcact gctccatctt

20

<210> 49  
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<212> DNA  
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<400> 49  
ttaagccttg gcaacatatt

20

<210> 50  
<211> 37  
<212> DNA  
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<400> 50  
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37

<210> 51  
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<400> 51  
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<210> 52  
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<400> 52  
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<210> 53  
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<400> 53  
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<210> 54  
 <211> 44  
 <212> DNA  
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<400> 54  
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<210> 55  
 <211> 44  
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 <222> (33)..(33)  
 <223> primer that does not encode amino acid

<220>  
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 <222> (21)..(21)  
 <223> primer that does not encode amino acid

<400> 55  
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 <212> PRT  
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<400> 56

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1 5 10

<210> 57

<211> 10

<212> PRT

<213> Candida sonorensis

<400> 57

Asp Phe Asn Thr Gly Ser Phe Ser Tyr Ser  
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<210> 58

<211> 18

<212> DNA

<213> Candida sonorensis

<400> 58

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18

<210> 59

<211> 20

<212> DNA

<213> Candida sonorensis

<400> 59

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<210> 60

<211> 36

<212> DNA

<213> Candida sonorensis

<400> 60

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<210> 61

<211> 68

<212> DNA

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<400> 61

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60

attattag

68

<210> 62

<211> 34  
<212> DNA  
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<400> 62  
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34

<210> 63  
<211> 75  
<212> DNA  
<213> Candida sonorensis

<400> 63  
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ttttgttttt gtttg

60

75

<210> 64  
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<212> DNA  
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<400> 64  
gcgatctcga gaaagaaacg acccatccaa gtgatg

36

a' <210> 65  
<211> 35  
<212> DNA  
<213> Candida sonorensis

<400> 65  
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35

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